BAYOU COURTABLEAU TMDL FOR AMMONIA

SUBSEGMENT 060204

US EPA Region 6

Final

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EXECUTIVE SUMMARY

Section 303(d) of the Federal Clean Water Act requires states to identify waterbodies that are not meeting water quality standards and to develop total maximum daily pollutant loads for those waterbodies. A total maximum daily load (TMDL) is the amount of a pollutant that a waterbody can assimilate without exceeding the established water quality standard for that pollutant. Through a TMDL, pollutant loads can be distributed or allocated to point sources and nonpoint sources discharging to the waterbody. A TMDL has been developed for ammonia for Bayou Courtableau.

Bayou Courtableau, Subsegment 060204, was listed on the October 28, 1999 Court Ordered §303(d) List as not fully supporting the water quality standard for propagation of fish and wildlife and was ranked as a high priority for TMDL development. Bayou Courtableau was listed on the October 28, 1999 Court Ordered §303(d) list for ammonia by virtue of its listing in the State of Louisiana's 1993 Nonpoint Source (NPS) Report. This subsegment was listed as "impacted by nonpoint source pollution", with ammonia listed as one of the suspected causes of impact (LDEQ, 1993). There is presently no criterion available for ammonia in the State's water quality standards. With no ammonia criterion available to establish a TMDL target, an alternative approach was used. On April 29, 1996, LDEQ issued a declaratory ruling which states: "That DO directly correlates with overall nutrient impact is a well-established biological and ecological principle. Thus, when the LDEQ maintains and protects DO, the LDEQ is in effect also limiting and controlling nutrient concentrations and impacts." DO serves as an indicator for which a water quality criterion exists and is used in the assessment of use support. Therefore, in this TMDL, the ammonia loading required to maintain the dissolved oxygen standard serves as the ammonia TMDL.

There are no significant point source dischargers for this subsegment. The minor point source dischargers were represented in the nonpoint source loads via benthic loads. Permit limits for these minor facilities are generally set by state policies. As presented in (LDEQ, 2000a), the DO standard of 5.0 mg/L can be maintained with a 30% reduction of all manmade nonpoint source loads year-round.

1. Introduction

Bayou Courtableau, Subsegment 060204, was listed on the October 28, 1999 Court Ordered §303(d) list as not fully supporting the water quality standard for the propagation of fish and wildlife and was ranked as a high priority for TMDL development. A TMDL for ammonia was developed in accordance with the requirements of Section 303(d) of the federal Clean Water Act. The purpose of a TMDL is to determine the pollutant loading that a waterbody can assimilate without exceeding the water quality standard for that pollutant; the TMDL also establishes the load reduction that is necessary to meet the standard in a waterbody. The TMDL consists of the wasteload allocation (WLA), the load allocation (LA), and a margin of safety (MOS). The wasteload allocation is the load allocated to point sources of the pollutant of concern, and the load allocation is the load allocated to nonpoint sources. The margin of safety is a percentage of the TMDL that accounts for the uncertainty associated with the model assumptions and data inadequacies.

2. Study Area Description

Water quality subsegment 060204 is part of the Vermilion-Teche River Basin and lies in south-central Louisiana. The upper end of the basin lies in the central part of the state near Alexandria, and the basin extends southward to the Gulf of Mexico. The basin is bordered on the north and northeast by a low escarpment and the lower end of the Red River Basin. The Atchafalaya River Basin is to the east, and the Mermentau River Basin is to the west (LDEQ, 1996).

Average annual precipitation in the segment, based on the nearest Louisiana Climatic Station in Crowley, is 56.91 inches based on a 30-year record (LSU, 1999). Land use in the Vermilion-Teche Basin is largely agricultural, the primary crops being corn, soybeans, and milo. In the segment under study, agricultural use accounts of 63.77% of the total segment area. Land use in the watershed is summarized in Table 1. See (LDEQ, 2000a) for additional discussion of the study area.

Table 1. Land Uses in Segment 0602

LAND USE TYPE	NUMBER OF ACRES	% OF TOTAL AREA
Urban	125	0.10
Rangeland	163	0.13
Agricultural	76,742	63.77
Forest Land	221	0.18
Water	4,775	3.97
Wetland	38,319	31.84
TOTAL AREA	76,000	100.00

2.1 Bayou Courtableau, Subsegment 060204

Bayou Courtableau is located in south central Louisiana. Subsegment 060204 is comprised of Bayou Courtableau and all tributaries, including Bayou Carron, Bayou Wauksha, Grand Gully, and numerous unnamed tributaries west of Bayou Teche; and Little Bayou Darbonne, Big Bayou

Darbonne, 3 Diversion Canals, and numerous unnamed tributaries east of Bayou Teche. The west and east sections of Bayou Courtableau come together near Port Barre and flow into Bayou Teche.

2.2 Water Quality Standards

The designated uses for Bayou Courtableau include primary contact recreation, secondary contact recreation and propagation of fish and wildlife. Bayou Courtableau was listed on the October 28, 1999 Court Ordered §303(d) list for ammonia by virtue of its listing in the State of Louisiana's 1993 Nonpoint Source (NPS) Report. This subsegment was listed as "impacted by nonpoint source pollution", with ammonia listed as one of the suspected causes of impact (LDEQ, 1993). There is presently no criterion available for ammonia in the State's water quality standards (LDEQ, 2000b).

With no ammonia criterion available to establish a TMDL target, an alternative approach was used. On April 29, 1996, LDEQ issued a declaratory ruling which states: "That DO directly correlates with overall nutrient impact is a well-established biological and ecological principle. Thus, when the LDEQ maintains and protects DO, the LDEQ is in effect also limiting and controlling nutrient concentrations and impacts." DO serves as an indicator for which a water quality criterion exists and is used in the assessment of use support. Therefore, in this TMDL, the ammonia loading required to maintain the dissolved oxygen standard serves as the ammonia TMDL.

The applicable dissolved oxygen criterion for Bayou Courtableau is 5.0 mg/L year-round.

2.3 Identification of Sources

The sources identified in the 1998 Louisiana Water Quality Inventory as affecting the water quality of Bayou Courtableau are natural and unknown sources (LDEQ, 1998). The 1993 Nonpoint Source Pollution Assessment Report specifically lists irrigated crop production, agriculture, and municipal sources as additional suspected sources of pollution (LDEQ, 1993).

2.3.1 Point Sources

Several minor point sources fall within the subsegment, however, these facilities were deemed either intermittent stormwater or minor discharges. The minor point source dischargers were represented in the nonpoint loading via benthic loads. Permit limits for these minor facilities are generally set by state policies.

2.3.2 Nonpoint Sources

The predominant land use along Bayou Courtableau is agriculture, which can contribute to ammonia loads through runoff. It is currently unknown to what relative extent agricultural activities contribute to ammonia loads. (LDEQ, 1993)

3. TMDL Load Calculations

LDEQ submitted a DO model for Bayou Courtableau subsegment 060204 in January 2000 (LDEQ, 2000a). The model was reviewed and approved by EPA. This model was used to address the ammonia listing for this segment. Table 5 of the DO TMDL modeling report presents cumulative WLAs, LAs, and MOS for nonpoint sources (LDEQ, 2000a). Table 2 presents the WLAs, LAs, and MOS for this ammonia TMDL.

Table 2. Total Maximum Daily Load
(UBOD = UCBOD + UNBOD)

ALLOCATION	SUMMER (MAY-OCT) DO criterion = 5.0 mg/L (lbs/day)	WINTER (NOV-APR) DO criterion = 5.0 mg/L (lbs/day)
Point Source WLA	0	0
Point Source Reserve MOS	0	0
Natural/Manmade Nonpoint Source LA	23,369	23,369
Headwater/Tributary Source LA	6,374	9,095
TMDL = WLA + LA + MOS	29,743	32,464

3.1 Loading Capacity and TMDL Formulation

According to (LDEQ, 2000a), input data for the calibration model was developed from data obtained during a watershed survey conducted on July 27-28, 1999. Additional cross-sections were obtained during a follow-up survey conducted in December, 1999.

Modeling was limited to low flow scenarios for both the calibration and the projections since the constituent of concern was dissolved oxygen and the available data was limited to low flow conditions.

The model used for this TMDL was LA-QUAL, a steady-state one-dimensional water quality model. In 1999, the LDEQ and Wiland Consulting, Inc. developed LA-QUAL based on QUAL-TX Version 3.4. The program was converted from a DOS-based program to a Windows-based program with a graphical interface and enhanced graphic output. Other program modifications specific to the needs of Louisiana and the LDEQ were also made. LA-QUAL is a user-oriented model and is intended to provide the basis for evaluating total maximum daily loads in the State of Louisiana.

3.2 Load Allocations

Year-round load allocations are presented in Table 2. See LDEQ (2000a) for a detailed discussion of load allocation. The load allocation in Table 2 is calculated from Table 5 of LDEQ (2000a).

As presented in LDEQ (2000a), the year-round DO criterion of 5.0 mg/L can be maintained with a 30% reduction of all manmade nonpoint sources.

3.3 Wasteload Allocations

The model uses wasteloads to represent treatment plant effluent or unmodeled tributaries. None of the tributaries were found to have flow and therefore, were not modeled. There were no significant dischargers on the mainstem. Several minor point sources fall within the subsegment. However, these facilities were deemed either intermittent stormwater or minor discharges. The minor point source dischargers were represented in the nonpoint loading via benthic loads. Permit limits for these minor facilities are generally set by state policies.

3.4 Seasonal Variation

Critical conditions for dissolved oxygen in Louisiana have been determined to occur when there is negligible nonpoint run-off and low stream flow, combined with high stream temperature. In addition, the models account for loadings that occur at higher flows by modeling sediment oxygen demand. Oxygen demanding pollutants that enter the stream during higher flows settle to the bottom and then exert the greatest oxygen demand during the high temperature seasons. Additionally, this TMDL looked at the winter and summer seasons by varying temperature.

3.5 Margin of Safety

The MOS accounts for any lack of knowledge or uncertainty concerning the relationship between load allocations and water quality. According to LDEQ (2000a), the highest temperatures occur in July and August, the lowest stream flows occur in October and November. The combination of these conditions, and the impact of other conservative assumptions regarding rates and loadings, yields an implied MOS, which is estimated to be in excess of 10%.

4. Other Relevant Information

Although not required by this TMDL, LDEQ utilizes funds under Section 106 of the federal Clean Water Act and under the authority of the Louisiana Environmental Quality Act to operate an established program for monitoring the quality of the state's surface waters. The LDEQ Surveillance Section collects surface water samples at various locations, utilizing appropriate sampling methods and procedures for ensuring the quality of the data collected. The objectives of the surface water monitoring program are to determine the quality of the state's surface waters, to develop a long-term data base for water quality trend analysis, and to monitor the effectiveness of pollution controls. The data obtained through the surface water monitoring program is used to develop the state's biennial 305(b) report (*Water Quality Inventory*) and the 303(d) list of impaired waters. This information is also utilized in establishing priorities for the LDEQ nonpoint source program.

The LDEQ has implemented a watershed approach to surface water quality monitoring. Through this approach, the entire state is sampled over a five-year cycle with two targeted basins sampled each year. Long-term trend monitoring sites at various locations on the larger rivers and Lake Pontchartrain are sampled throughout the five-year cycle. Sampling is conducted on a monthly

basis or more frequently if necessary to yield at least 12 samples per site each year. Sampling sites are located where they are considered to be representative of the waterbody. Under the current monitoring schedule, targeted basins follow the TMDL priorities. In this manner, the first TMDLs will have been established by the time the first priority basins will be monitored again in the second five-year cycle. This will allow the LDEQ to determine whether there has been any improvement in water quality following establishment of the TMDLs. As the monitoring results are evaluated at the end of each year, waterbodies may be added to or removed from the 303(d) list. The sampling schedule for the first five-year cycle is shown below. The Vermilion-Teche River Basin will be sampled again in 2003.

1998 – Mermentau and Vermilion-Teche River Basins
1999 - Calcasieu and Ouachita River Basins
2000 – Barataria and Terrebonne Basins
2001 – Lake Pontchartrain Basin and Pearl River Basin
2002 – Red and Sabine River Basins

(Atchafalaya and Mississippi Rivers will be sampled continuously.)

In addition to ambient water quality sampling in the priority basins, the LDEQ has increased compliance monitoring in those basins, following the same schedule. Approximately 1,000 to 1,100 permitted facilities in the priority basins were targeted for inspections. The goal set by LDEQ was to inspect all of those facilities on the list and to sample 1/3 of the minors and 1/3 of the majors. During 1998, 476 compliance evaluation inspections and 165 compliance sampling inspections were conducted throughout the Mermentau and Vermilion-Teche River Basins.

5. Public Participation

When EPA establishes a TMDL, 40 C.F.R. § 130.7(d)(2) requires EPA to publicly notice and seek comment concerning the TMDL. Pursuant to an October 1, 1999, Court Order, EPA prepared this TMDL. After submission of this TMDL to the Court, EPA commenced preparation of a notice seeking comments, information and data from the general and affected public. Comments and additional information were submitted during the public comment period and this Court Ordered TMDL was revised accordingly. EPA has transmitted this revised TMDL to the Court, and to the Louisiana Department of Environmental Quality (LDEQ) for incorporation into LDEQ's current water quality management plan.

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